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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,237	03/04/2002	Dawei Huang	HUANG 3 (58661)	6580
7590 05/08/2006			EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C.			TRAN, KHANH C	
P.O. BOX 8910			ART UNIT	
RESTON, VA 20195			PAPER NUMBER	
			2611	

DATE MAILED: 05/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/090,237	HUANG, DAWEI	
	<b>Examiner</b>	<b>Art Unit</b>	
	Khanh Tran	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03/04/2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. The Amendment filed on 03/03/2006 has been entered. Claims 1-23 are pending in this Office action.

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 6, 10-11, 13 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. U.S. Patent 6,088,390 in view of Molson et al. U.S. Patent 6,634,009 B1.

Regarding claim 1, Russell et al. is directed to a method and system which combines a properly designed FEC scheme and the periodic transmission of known symbols to obtain a desired error performance in a point-to-multipoint digital transmission system employing a DFE which induces error propagation.

FIG. 3 illustrates a block diagram of an exemplary digital transmission system. In column 3 lines 30-45, Russell et al. teaches that for purposes of illustrating the invention, it is assumed that the characteristics of the modulation technique of modulator 33 and channel 34 are such that catastrophic error propagation is possible. Referring to figure 3, the digital transmission system includes an FEC encoder 31, an interleaver 32 and a modulator 33. FEC encoder 31 and interleaver 32 constitute the claimed data receiving circuit; see column 3 lines 20-35. Further in column 3 lines 55-65, Russell et al. teaches that a periodic sequence of known symbols, referred to as a "refresh sequence", of length at least equal to the length of the feedback filter is periodically added to the interleaver output and transmitted (step 400 in figure 4). The receiver of this transmission will use knowledge of this sequence to pass correct symbols to the feedback filter, and thus terminate any error propagation.

Russel does not teach an encoder as set forth in the application claim.

Molson et al. teaches in figure 2 a typical modulator including FEC encoder 222, a convolutional interleaver 224 and a convolutional encoder 223; see column 5 lines 5-25. In column 1 lines 50-62, as discussed in Molson et al. invention, digital communications systems designers can choose many types of error-correction codes to reduce the effect of errors in transmitted data, including burst errors that arise during transmission of data. Because the use of inner coding and outer coding would further enhance error detection and correction, one of ordinary skill in the art would have been motivated to modify Russel teachings to implement a convolutional encoder as taught in Molson et al. invention.

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Regarding claim 3, as recited in claim 1, the modified teachings include a convolutional encoder.

Regarding claim 6, claim 6 is rejected on the same ground as for claim 1 because claim 1 claims a system performing steps claimed in claim 6.

Regarding claims 10 and 13, claims 10 and 13 are rejected on the same ground as for claim 3 because of similar scope.

Regarding claim 11, because a periodic sequence of known symbols is periodically added to the interleaver output and transmitted because zeros are inserted between information bits. Convolutional code includes time varying convolutional code.

Regarding claim 21, claim 21 is rejected on the same ground as for claim 10 because of similar scope.

Regarding claim 22, claim 22 is rejected on the same ground as for claim 11 because of similar scope.

4. Claims 2, 7-9 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. U.S. Patent 6,088,390.

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Regarding claim 2, Russell et al. does not teach the known symbols comprise zeros.

However, since the symbols comprising zeros are known sequence, one of ordinary skill in the art at the time the invention was made would have been motivated to modify Russell et al. teachings to periodically insert zero symbols.

Regarding claim 7, claim 7 is rejected on the same ground as for claim 2 because of similar scope.

Regarding claim 8, because redundant bits are appended in the information signal, for the case of memory length equal to two bit symbol, a 0 sequence is inserted after each of two information bits as claimed in the application claim.

Regarding claim 9, using analogous reasons as in claim 8, redundant bits are added after each symbol for error correction. Hence, for the case of four-bit symbol, one zero can be inserted between every four bits of data points.

Regarding claim 18, claim 18 is rejected on the same ground as for claim 2 because of similar scope.

Regarding claim 19, claim 19 is rejected on the same ground as for claim 8 because of similar scope.

Regarding claim 20, claim 20 is rejected on the same ground as for claim 9 because of similar scope.

5. Claims 4-5, 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. U.S. Patent 6,088,390 and Molson et al. U.S. Patent 6,634,009 B1 as applied to claim 1 above and further in view of Alamouti (previously cited) U.S. Patent 5,931,965.

Regarding claim 4, Russell et al. and Molson et al. do not teach the encoder being operative for Trellis encoding as set forth in the application claim.

As discussed in Alamouti invention (see column 7 lines 50-65), trellis-coded modulation is a forward error correction coding technique, which is also well known in the art. Trellis codes are convolutional codes that are designed and optimized according to a specific modulation scheme. In view of the foregoing discussion, one of ordinary skill in the art would have recognized that the Trellis encoder 810 as taught in figure 8 of Alamouti invention is convolutional encoder. The number of connections between Trellis nodes in a Trellis is reduced. The Trellis encoder 810 encodes the expanded data input to produce a channel coded data stream.

Regarding claim 5, referring to Alamouti invention, the convolutional encoder 200 includes shift register memory units 205, 210, 215, as well as summers 220, 225 as shown in figure 2A. Memory units 205, 210, 215 have finite length, e.g.  $m$  length, corresponding to the claimed memory length  $m$ ; see figure 2A. Referring to Russell et

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al. invention, as recited in claim 1, Russell et al. teaches that a periodic sequence of known symbols is periodically added to the interleaver output.

Regarding claim 14, claim 14 is rejected on the same ground as for claim 5 because of similar scope.

Regarding claim 15, claim 15 is rejected on the same ground as for claim 4 because of similar scope.

Regarding claim 16, claim 16 is rejected on the same ground as for claim 5 because of similar scope.

Regarding claim 17, for each binary input sequence to trellis diagram, there is one corresponding code word via distinct paths. Therefore, application of code word is one-to-one mappings to binary input sequence.

6. Claims 12 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al. U.S. Patent 6,088,390 and Molson et al. U.S. Patent 6,634,009 B1 as applied to claims 10 and 21 above, and further in view of admitted prior art in the original disclosure.

Regarding claims 12 and 23, Russell et al. does not teach the claimed features.



Amitted prior art discusses in paragraph [0031] a convolutional code that may cause catastrophic error propagation has the following property: there exists an input sequence with infinite Hamming weights such that its corresponding code word generated by the encoder has a finite Hamming weight. As a first definition, convolutional code could be considered catastrophic if its corresponding state diagram contains a circuit in which a nonzero input sequence corresponds to an all-zero output sequence. Because the foregoing discussion is the definition and catastrophic error code, one of ordinary skill in the art would have recognized that the code causing catastrophic error propagation as taught in Russell et al. and Molson et al. invention would have such recited properties.

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

*Khanh Cong Tran*

05/04/2006

Primary Examiner

KHANH TRAN